

WE CLAIM:

1. A drill template comprising:
a vacuum housing having a CAD-formed contact surface; and
at least one drill bushing extending through said vacuum housing
from a top surface to an interior surface of said vacuum housing.
2. The drill template as claimed in claim 1 wherein said vacuum housing includes a vacuum port adapted to be connected to a vacuum system.
3. The drill template as claimed in claim 1 wherein said vacuum housing includes a CAD-formed edge of part locator.
4. The drill template of claim 1 wherein said CAD-formed contact surface of said vacuum housing conforms to a CAD engineering solid model of the outside mold line surface of a structure.
5. The drill template of claim 1 wherein said vacuum housing is formed of a laser sintered material using a CAD solid model to achieve an exact fit to a surface of a structure.
6. The drill template of claim 1 wherein said vacuum housing includes at least one index hole extending from said top surface to said contact surface of said vacuum housing.

7. A drill template for drilling holes into a structure, said drill template comprising:

a vacuum housing having a CAD-formed contact surface, said vacuum housing being formed by selective laser sintering;

5 at least one drill guide bushing extending through said vacuum housing from a top surface to an interior surface of said vacuum housing; and
at least one vacuum port integral to said vacuum housing.

8. The drill template of claim 7 wherein said vacuum housing includes at least one drill support attachment positioned near said at least one drill guide bushing, said at least one drill support attachment adapted to secure a drill to said drill template.

9. The drill template of claim 7 further including a skirt having said CAD-formed contact surface, said skirt enclosing an interior space to form a vacuum chamber.

10. The drill template of claim 9 wherein said vacuum port communicates with said vacuum chamber.

11. The drill template of claim 7 wherein said CAD-formed contact surface of said vacuum housing conforms to an exact fit with a mold line surface of said structure.

12. A debris collecting vacuum drill template for forming holes in a structure, said drill template comprising:

- a vacuum housing having a CAD-formed contact surface;
- at least one drill bushing extending through said vacuum housing
- 5 from a top surface to an interior surface of said vacuum housing;
- at least one drill support attachment positioned near said at least one drill bushing, said at least one drill support attachment adapted to secure a drill to said drill template; and
- an integral vacuum port that provides vacuum communication
- 10 from an opening to said interior surface.

13. The drill template of claim 12 further including at least one fastener arm with a fastener that holds sections of said vacuum housing together.

14. The drill template of claim 12 further including at least one dovetail groove, said dovetail groove filled with a hardened adhesive that holds sections of said vacuum housing together.

15. The drill template of claim 12 further including at least one recess accommodating a fastener that holds sections of said vacuum housing together.

16. The drill template of claim 12 further including at least one hole accommodating with a press fit a dowel pin that aligns and holds sections of said vacuum housing together.

17. The drill template of claim 12 wherein said vacuum housing includes at least one index hole for positioning and aligning said vacuum housing on said structure.

18. The drill template of claim 12 wherein said vacuum housing includes a CAD-formed edge of part locator formed according to a CAD solid model of said structure.

19. The drill template of claim 12 wherein said vacuum housing is formed from nylon by selective laser sintering.

20. A drilling system for an aircraft fuselage structure, said system comprising:

- a drill template which includes
 - a vacuum housing with a skirt having a CAD-formed contact
 - 5 surface formed to an exact fit with a surface of said aircraft fuselage structure;
 - at least one drill guide bushing extending through said vacuum housing from a top surface to an interior surface of said vacuum housing;
 - at least one vacuum port integral to said vacuum housing;
 - at least one index hole for positioning and aligning said vacuum
 - 10 housing on said aircraft fuselage structure, said index hole extending from said top surface to said CAD-formed contact surface of said vacuum housing;
 - a CAD-formed edge of part locator formed according to a CAD solid model of said aircraft fuselage structure and fitting to a precise location of said aircraft fuselage structure; and
 - 15 a vacuum port that provides vacuum communication from an external opening to said interior surface.

21. A method of forming a pattern of holes in a structure comprising a CAD-built skin and substructure, the method comprising steps of:

- positioning a drill template on a surface of said structure using a CAD-formed edge of part locator of said drill template, said CAD-formed edge of part locator formed according to a CAD solid model of said structure;
- 5 contacting said structure with an exact fit between a CAD-formed contact surface of said drill template and a CAD-built mold line surface of said structure;
- connecting a vacuum system to an integral vacuum port of said
- 10 drill template;
- drilling at least one hole into said structure guided by a drill bushing of said drill template.

22. The method of claim 21 wherein said positioning step further includes steps of:

- locating said drill template to a substructure of said structure using said CAD-formed edge of part locator to fit said drill template to a precise
- 5 location of said CAD-built substructure;
- drilling an index hole into said substructure;
- backdrilling an index hole into said skin;
- positioning said template on said skin so that a CAD-formed contact surface of said template achieves an exact fit with said CAD-built mold
- 10 line surface of said skin of said structure.

23. The method of claim 21 further including a step of securing said drill template to said structure with a pin clamp inserted in an index hole in said drill template and said structure.

24. The method of claim 21 further including a step of operating said vacuum system while drilling said at least one hole.

25. The method of claim 21 further including a step of removing and collecting drilling debris of said structure generated from drilling said at least one hole in said structure.

26. The method of claim 21 further including a step of securing a drill tool to said template using a drill support attachment.